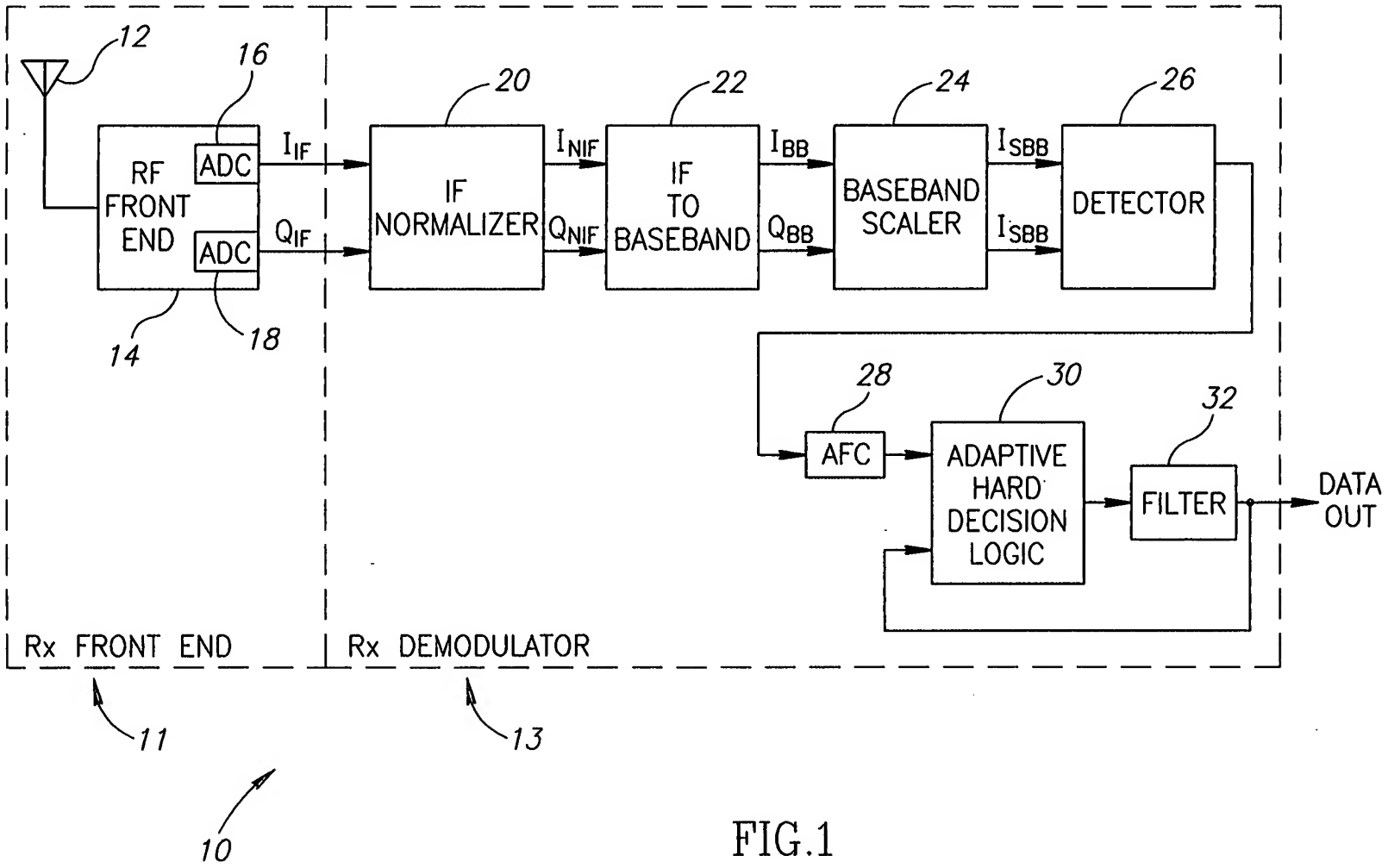
12
16
20
22
24
26
RF FRONT END
ADC
ADC
I_{IF}
Q_{IF}
IF NORMALIZER
I_{NIF}
Q_{NIF}
IF TO BASEBAND
I_{BB}
Q_{BB}
BASEBAND SCALER
I_{SBB}
I_{SBB}
DETECTOR
14
18
28
30
32
AFC
ADAPTIVE HARD DECISION LOGIC
FILTER
DATA OUT
Rx FRONT END
Rx DEMODULATOR
11
13
10

FIG.1

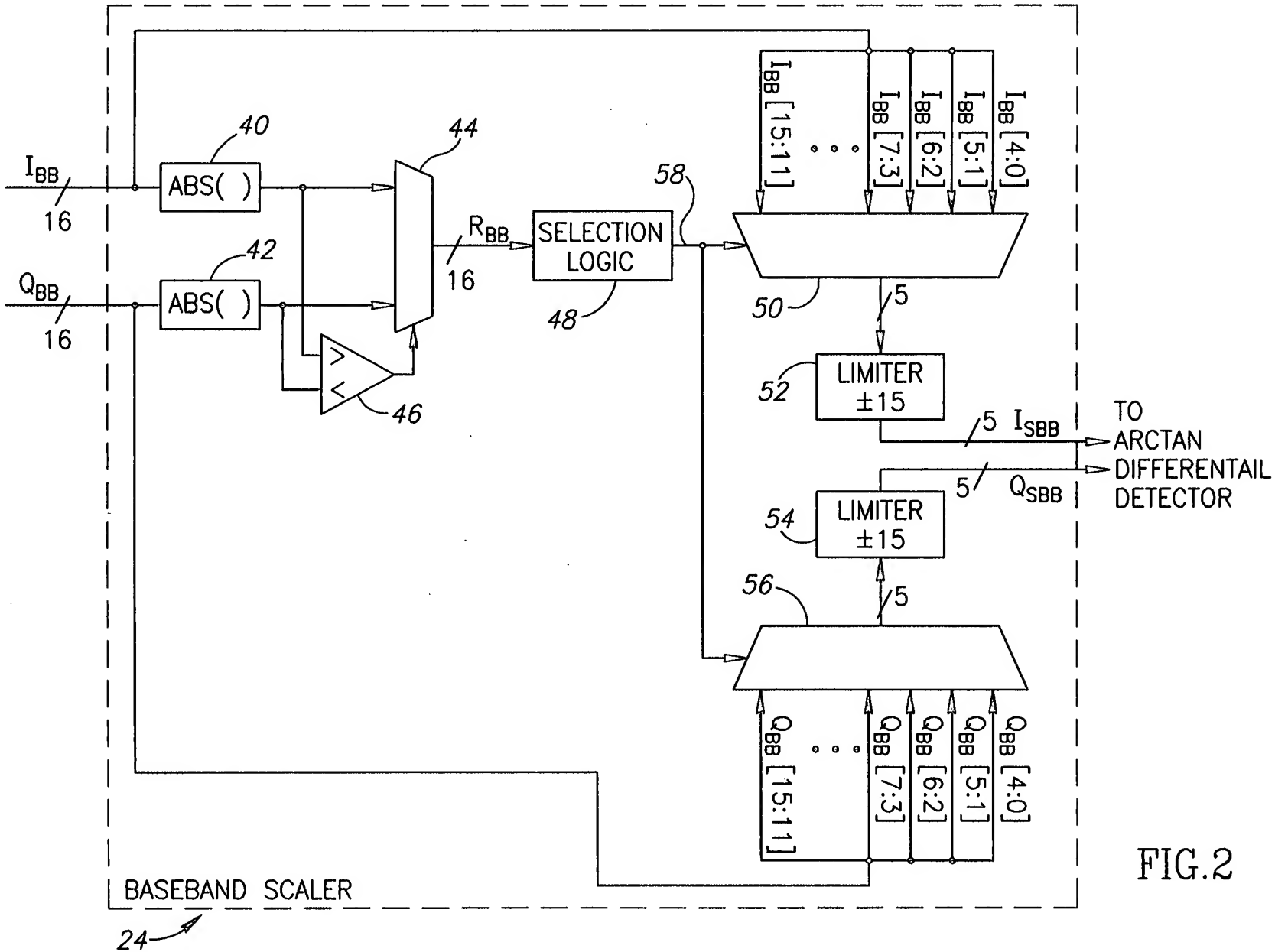
I_{BB}
16
Q_{BB}
16
ABS( )
ABS( )
40
42
44
46
R_{BB}
16
SELECTION LOGIC
48
58
I_{BB} [15:11]
I_{BB} [7:3]
I_{BB} [6:2]
I_{BB} [5:1]
I_{BB} [4:0]
50
5
LIMITER ±15
52
5 I_{SBB}
TO ARCTAN DIFFERENTAIL DETECTOR
5 Q_{SBB}
LIMITER ±15
54
56
5
Q_{BB} [15:11]
Q_{BB} [7:3]
Q_{BB} [6:2]
Q_{BB} [5:1]
Q_{BB} [4:0]
BASEBAND SCALER
24

FIG.2

LISTING 1

```
if (R_BB [14]=1)
        I_SBB = I_BB [15:11];
        Q_SBB = Q_BB [15:11];
elseif (R_BB [13]=1)
        I_SBB = I_BB [14:10];
        Q_SBB = Q_BB [14:10];
                .
                .
                .
                .
elseif (R_BB [4]=1)
        I_SBB = I_BB [5:1];
        Q_SBB = Q_BB [5:1];
else
        I_SBB = I_BB [4:0];
        Q_SBB = Q_BB [4:0];
end
```

FIG.3

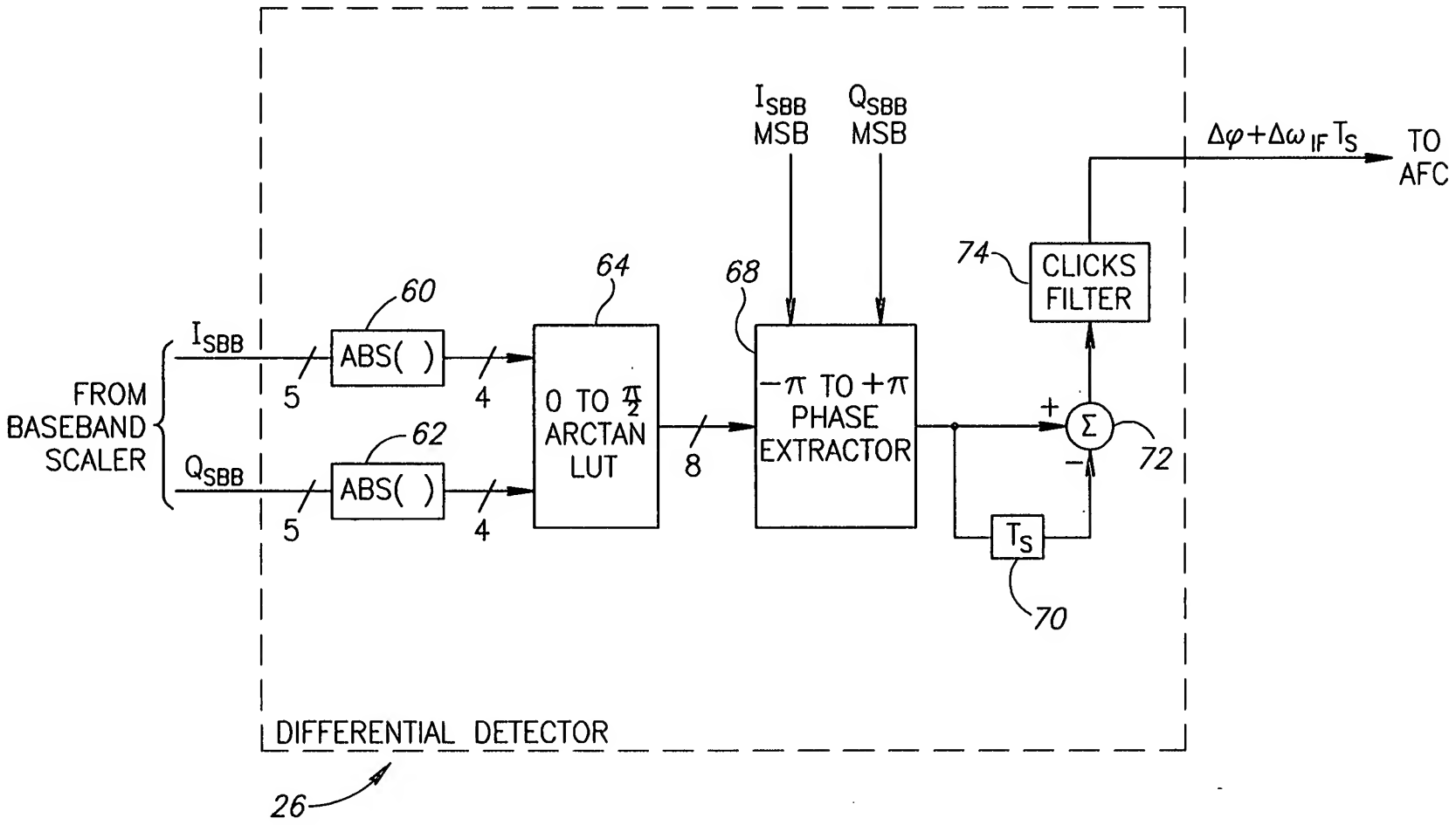
FROM BASEBAND SCALER
I_{SBB}
Q_{SBB}
5
5
ABS( )
ABS( )
60
62
4
4
64
0 TO $\frac{\pi}{2}$ ARCTAN LUT
8
68
I_{SBB} MSB
Q_{SBB} MSB
$-\pi$ TO $+\pi$ PHASE EXTRACTOR
74
CLICKS FILTER
$\Delta\varphi+\Delta\omega_{IF}T_S$
TO AFC
+
Σ
−
72
T_S
70
DIFFERENTIAL DETECTOR
26

FIG.4

ATAN LUT CONTENTS

I_{SBB} MAGNITUDE →

Q_{SBB} MAGNITUDE ↓

101	59	41	31	25	21	18	16	14	13	12	11	10	9	9
140	101	75	59	49	41	36	31	28	25	23	21	20	18	17
160	126	101	82	69	59	52	46	41	37	34	31	29	27	25
170	142	119	101	86	75	66	59	54	49	45	41	38	36	33
176	152	132	115	101	89	79	72	65	59	55	51	47	44	41
180	160	142	126	112	101	91	82	75	69	64	59	55	52	49
183	165	149	135	122	110	101	92	85	78	73	68	63	59	56
185	170	155	142	130	119	109	101	93	86	80	75	71	66	63
187	173	160	148	136	126	116	108	101	94	88	82	78	73	69
188	176	164	152	142	132	123	115	107	101	94	89	84	79	75
189	178	167	156	146	137	129	121	113	107	101	95	90	85	81
190	180	170	160	151	142	133	126	119	112	106	101	95	91	86
191	182	172	163	154	146	138	130	124	117	111	106	101	96	91
192	183	174	165	157	149	142	135	128	122	116	110	105	101	96
193	184	176	168	160	152	145	138	132	126	120	115	110	105	101

φ PHASE OUTPUT

FIG.5

LISTING 2

if $Q_{SBB}=0$ then

arctan LUT component output is 0;

elseif $I_{SBB}=0$ then

arctan LUT component output is 201 (=round($128*\frac{\pi}{2}$));

else

arctan LUT component output is according to the matrix of Fig.5, where the upper left corner is the element of (1,1) indexes and the lower right corner is of (15,15) indexes;

end

FIG.6

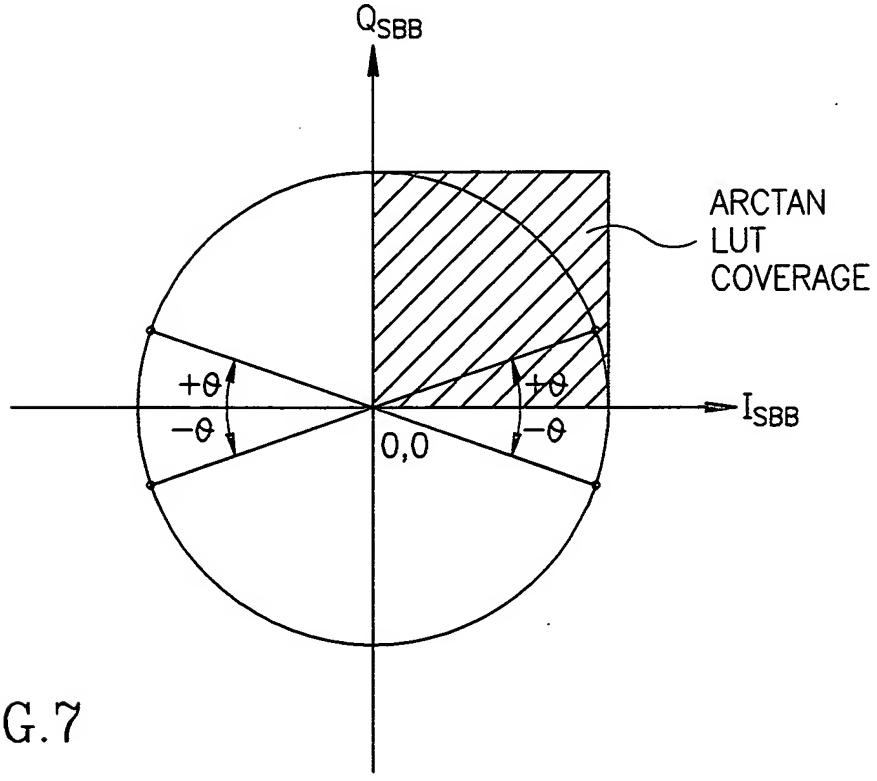

FIG.7

LISTING 3

```
if (sign(I_SBB(k)) >= 0
        if (sign(Q_SBB(k)) >= 0
            phi(k) = phi_base(k);
        else
            phi(k) = -phi_base(k);
        end
else
        if (sign(Q_SBB(k)) >= 0)
            phi(k) = round(π+128)-phi_base(k);
        else
            phi(k) = phi_base(k)-round(π+128);
        end
end
```

FIG.8

LISTING 4

```
if (delta_phi(k) > round(π))
        delta_phi(k) = delta_phi(k)-round(2π);
elseif (delta_phi(k) < -round(π)
        delta_phi(k) = delta_phi(k)+round(2π);
```

FIG.9